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Transactions *of* The Chartered Surveyors' Institution

SESSION 1936-1937.

AT THE ORDINARY GENERAL MEETING

Held at the Chartered Surveyors' Institution, Monday, 5th April, 1937.

Mr. J. M. THEOBALD (President) in the Chair.

NEW MEMBERS.

The following new members were received by the PRESIDENT prior to the Meeting, and signed the Register:—

Professional Associates :

AYLIFFE, REGINALD WILLIAM
JOPLING, GEORGE STEPHENSON

A DISCUSSION took place on Mr. F. L. COLLINS' Paper entitled

VALUATION OF LIFE INTERESTS IN REAL PROPERTY AND REVERSIONS.

Mr. CUTHBERT LAKE (Member of Council) proposed a very grateful vote of thanks to Mr. Collins for presenting an excellent paper which, while not too long, included almost a complete outline of the subject with which it dealt, the valuation of life interests in real property and reversions—the historical side of it, the mathematical side, and, what was still more wonderful, the practical side. The mathematical side of it was perhaps fairly well known, but the historical side was almost new, and there Mr. Collins had left out some of the "racy bits." Mr. Collins did not point out, for example, that the Northampton Table omitted to include anyone who was born but who failed to be baptized, because one was not officially born in those days until one had been baptized. On the other hand, it did include all the deaths, and that accounted for some of its curious inequalities.

He had great sympathy with Mr. Collins in tilting again at the Northampton Table ; people had been doing that for nearly a hundred years. Certainly Carlisle had tried to do it. His own first work had been on HM and OM, and it was only of recent years that he had taken Tables 9 and 10. He believed, however, that for practical purposes the only reliable table was that which was published in *Whitaker's Almanack*, and the ordinary working valuer would find more real sound information in *Whitaker's Almanack* than anywhere else.

The actuary when he was called upon to value reversions and so on was usually valuing for purchase in bulk, and had a sufficient number of them to average what the differences in life meant. The ordinary valuer, on the other hand, was generally called in for some special occasion because something had happened. Such valuers knew the poetry of probate and the romance of reversions ; they knew the queer things in life which brought a reversion or a life interest into their office, and they knew that the tables for most of those cases were a mere guide and something which they could talk about afterwards, but that in actual fact they were not the main thing to consider in making the valuation. He had obtained £12,000 more than the tables would give for a contingent life interest a few years ago through

knowing a little of the special circumstances of the case ; he happened to know that the life tenant, who was a lunatic and had not been seen for some years, suffered from the same complaint as the contingent reversioner, who was loaded up considerably, and a lunatic in an asylum was likely to die more quickly of that complaint than other people. He knew that because he had been on the board of management of a hospital for many years and he learned it there. There were such things as that which one had to learn if one were doing general practical work as compared with the scientific work where reversion policies and life interests were dealt with mainly in bulk.

He would like to give a very personal example. It so happened that he had a very complete knowledge of three generations in one family. His grandfather, his father and himself were each in turn, round about the age of 18, told that they had not twelve months to live, and possibly not six ; but, being a very obstinate family they did not regard it as necessary to die, and so they went on and in their middle twenties got themselves insured, having taken great care of themselves so as to pass the doctor. His grandfather went on paying until he was 93, his father until the age of 87, and he himself was still paying at 62. What was one to do with lives like that—people who ought to have died years ago?

There was no end to the stories which one could tell of valuations of reversions, but nowhere had he come across such a mass of real information concerning them, and of information dealing with the practical as well as the mathematical side, as in the paper which Mr. Collins had presented, a paper which would always form a masterly introduction to the subject.

Mr. W. R. Jenkins, B.Sc. (Fellow), said it gave him very great pleasure to second the vote of thanks to Mr. Collins for a paper which was one of very great interest and instruction to the members of the Institution. Mr. Collins was so great an authority upon the subject that personally he felt it would be almost presumptuous on his part to criticise any of the views expressed in the paper, and therefore what he had to say must be regarded not as questioning the opinions expressed but as being put forward in the hope that Mr. Collins would amplify and elucidate his opinions still further in replying to the discussion and clear up any lingering doubts.

Mr. Collins said he was afraid he might shock his readers when he said that the actuary did not employ tables of the expectation of life for any other purpose than the comparison of mortality tables, and later in the paper a warning was given against using those tables for valuing a life interest as being the

same as the value of a term certain equal to the number of years' expectation of life. Personally he did not think that surveyors would be shocked by the former statement or that many of them would need the warning. It was a point which was drilled into every student who took the Intermediate examination, and no doubt they detained that warning in their professional life. He liked very much, however, the very simple explanation which Mr. Collins quoted from a paper by Mr. Whittall of why that process was not permissible. He felt, however, that since the expectation of life tables were of no importance for any other purpose than the comparison of mortality tables, and since mortality tables could be compared in other ways, such as by the rate of mortality at any given age, tables of expectation of life were rather useless and would best be discarded. If they were not published, the warning which Mr. Collins gave would not be needed, and in any case it seemed futile to publish tables and then to warn people against their use.

He heartily agreed with Mr. Collins in deploring the continued use of the Carlisle and Northampton Tables, and the Northampton Table in particular, but he was far from convinced that there was any better table to use than the English life. Mr. Collins preferred the tables which were used for insurance and annuity purposes, and gave as his reason that the English Life Tables included "all sorts and conditions of men, some in hospital "and many whose occupations are by no means healthy." "Life tenants as a class," it was stated in the paper, "closely "resemble annuitants. They have the same regular income and "live a sheltered existence." Against that, however, it might be noted that Mr. Collins himself referred to the fact that self-selection exercised by annuitants and medical selection on the part of life offices succeeded in eliminating bad lives. Life tenants and contingent reversioners, however, were not self-selected or medically selected, and there seemed no reason why they should not contain almost a normal proportion of unhealthy persons, and even some in hospitals, nursing homes and asylums. Life tenants, it was true, had a regular income, but it was not always a big income, and personally he questioned whether their lives were as sheltered as was suggested. They did not work at dangerous trades, but they might have dangerous relaxations, such as hunting or even motoring. Mr. Lever's investigations, which were quoted on the same page of the paper, seemed to bear out that view, for, as Mr. Collins said, life tenants showed a higher value for the reversion than the annuity experience would suggest, which indicated, of course, a higher rate of mortality. He would therefore suggest that, while the English Life Table no doubt showed too great a rate of mortality, the error

was less than that which was made on the other side by using figures applicable to annuities and to insurance.

The sections of the paper which dealt with contingent reversions, life interests and reversionary life interests were particularly important and well worthy of close study, especially by those who had frequently to deal with problems of that character. There were, however, large numbers who practised as valuers who met with problems of that type but seldom, and who would much prefer to have at their disposal figures of years' purchase rather than have to work with the single premium as a basis. Not only was that a convenience to them, but serious errors were thereby minimised. He said that because in preparing tables of years' purchase it was possible to arrange the work in a systematic manner working out the years' purchase at any particular age from the years' purchase at the next succeeding year. By that means, when all were done and the last were checked, all were proved correct, and therefore errors were altogether avoided so long, of course, as the theory was sound.

He had used that procedure in his book to which Mr. Collins referred in the section of the paper dealing with life interests. He would no doubt be excused from referring to that book because Mr. Collins had already done so and had criticised him for supposing that premiums could be invested at 3 per cent. Mr. Collins said that offices used a rather higher rate than 3 per cent., and loaded the premiums. The effect of the loading would be to reduce the effective rate of interest, and probably to bring it back to somewhere in the neighbourhood of 3 per cent. Mr. Collins was no doubt right, from his point of view, in preferring that the exact premium for the life in question should in each case be ascertained from an insurance office, and the necessary calculation made with that as a basis. It should, however, be borne in mind that the office would not offer a policy at the proper rate without medical examination and that the life tenant would possibly not submit himself to such an examination if his pocket was not affected by the transaction. In any case the object of the book was largely to avoid the necessity for the calculations which followed the ascertainment of the single premium and the possibility of mistakes in those calculations. Those calculations were by no means child's play to practitioners who came across problems of the character in question only on rare occasions, and who had consequently become unskilled as to their treatment, so that in the past they had relied trustingly upon the only tables of years' purchase available to them based on the Northampton and Carlisle Tables of mortality. He hoped and believed that he had at any rate given them something better than that. The valuer could, after all, make some allow-

ance for the health and sex of the life tenant by an adjustment of the rate of interest or of the years' purchase ; in other words, he could do his own loading in his own way according to his own judgment as he had had to do in the same circumstances in the past.

In seconding the vote of thanks, he would like in conclusion to express his personal thanks to Mr. Collins for a most interesting and instructive paper.

Mr. Henry Brown, m.a. (President of the Institute of Actuaries) (Visitor), expressed his thanks to the President and Council of the Chartered Surveyors' Institution for their kind invitation to himself and to other members of the Institute of Actuaries to be present that evening. He did not, he said, wish to deal with any of the points raised in the discussion which would be better left to Mr. Collins, who was a specialist on the matters in question.

Mr. E. H. Lever (Member of Council, Institute of Actuaries) (Visitor) said he had been very pleased to be able to respond to the invitation of the Chartered Surveyors' Institution to be their guest that evening, and he greatly welcomed the tangible evidence of co-operation between the two Institutes which the present occasion afforded.

He had very little to say, but he would like, in all friendliness, to cross swords with Mr. Lake. He understood Mr. Lake to suggest that the Institute of Actuaries was a very scientific body, and that actuaries were scientific and not very practical. Most actuaries, he thought, sometimes wished that that was so ; most of them felt that they were practical without being very scientific. They had in the course of their work, just as much as surveyors had in the course of theirs, essentially to deal with practical matters, and therefore they used all their instruments with discretion, more particularly as they knew how those instruments were manufactured.

This was, after all, an age of specialisation, and, being an age of specialisation, the best results of human endeavour could be obtained only if the specialist was willing to put the fruits of his knowledge and his skill at the disposal of the community as a whole. It so happened that in certain aspects of their work surveyors were called upon to use a standard of measurement which members of the actuarial profession compiled ; and, as in the case of other instruments, it was not only necessary to know where to find it and more or less how to use it, but also necessary to have some idea of its degree of reliability. Mr.

Collins in his very interesting historical survey of the origin and compilation of mortality tables had shown how actuaries had tried by using better materials and improved methods of construction each time to manufacture a more efficient instrument, and his paper would be extremely well worth while even if it achieved only one thing, namely, to convince those who read it, if they were not convinced already, that there was nothing immutable about a mortality table. Mr. Collins had shown how, step by step, a higher degree of efficiency in the construction of mortality tables had been reached. He had also shown that research into the laws of mortality was of relatively recent birth, and therefore that it was just as absurd to use the crude instruments which resulted from the early efforts as it would be for a surveyor to try to build a modern building with the implements of the Stone Age.

We lived in a changing world and change was always going on. The main point to be borne in mind was that the law of mortality was a function not merely of age and of the class of life concerned, but also of the period during which people were living. It was an interesting reflection that surveyors themselves contributed something to the third of these influences, inasmuch as better housing and improved sanitation were two important contributory factors to the improvement in vitality. Actuaries for their part, bearing in mind that mortality tables were used mostly in varying degrees and with varying ability to make calculations with regard to future happenings, were trying to make an even more precise instrument by making some allowance for the time factor. They would be the last to say that there was nothing more to be done in that respect, and, if they were called upon to offer observations some five or ten years hence, they would probably speak with the same amused tolerance of the tables that they were making now as they now used in referring to the Northampton Table.

In conclusion he would like to say once again how glad he was of the opportunity to be present that evening.

Mr. C. Herbert Bedells (Past-President) remarked that recently he had come across an extract in a paper which had rather surprised him as no doubt it had surprised others. Speaking in the House of Commons a few days ago Mr. Sandys, M.P., had said: "It is no good Hon. Members thinking that "because the expectation of life has increased twenty years they "can hope to live twenty years longer than their parents because "this will not be the case. The advance of medicine, surgery "and hygiene has undoubtedly made a great improvement in the "health of the nation, but it has made very little difference

" in the expectation of life of adults. The expectation of life of " a man of 65 to-day, as compared with a man of 65 in 1871, " has increased by only some nine months. Where a change " has taken place is in the extremely satisfactory decline in " infant mortality. In the category of children under one year " of age the deaths have fallen from one in every seven live births " in 1886 to one in twenty in 1935 ; in other words, during that " period infant mortality has been reduced by two-thirds."

Surveyors were often interested in the expectation of life of clients who were tenants for life, and their general reaction to the state of things at the present time had, he thought, been to conclude that the expectation of life of adults had increased greatly within the last twenty, thirty, forty and fifty years, whereas, if the statement which he had quoted was correct, it had increased only by a fraction of one year. It would be interesting to learn from Mr. Collins whether the statement in question was statistically accurate.

The paper would be of great value for purposes of reference, and he was glad that it would find a place in the *Transactions* of the Institution.

Colonel H. C. Cole (Vice-President) said that as a member of the Institution who had only very occasionally to make a valuation based on one of the tables referred to in the paper, and who when he did so was entirely ignorant of which table to use, he would like to put a question to Mr. Collins. He had read the paper and, as far as his mind permitted, could understand it ; but he was looking, as everyone did, for a short cut in his work. He had a profound distrust in the Northampton and Carlisle Tables, but he would like Mr. Collins to say frankly which was the best table to use, so that the next time he had to value a property dependent on someone's life, either by reversion or the value of the life interest, he would know which table to use and what that table represented. Did the table represent the average person, or the members of the Institute of Actuaries or of the Chartered Surveyors' Institution, or did it represent people in asylums or in Government employment? If the basis could be given, that would give people like himself the x, and they could then make the necessary adjustments as the case required. He would be most grateful for that information.

Mr. Lake had said that it was only necessary to look at *Whitaker's Almanack*, but he would like to know what that table meant. Even an ideal table must constantly be changed, because mortality and conditions of life altered. When such a table was available, who was to say " This is a good life " or " This is a

" bad life "? He might be purchasing a reversion on behalf of a client, and might not be permitted to see the existing life. Even if he did, he was not a doctor ; he was supposed to be a surveyor or a valuer. He would have to apply his own judgment as to the type of life on which his valuation was dependent ; therefore, when there was an arbitration case involving life interest, it would obviously be necessary to consult doctors as well as surveyors. It was often necessary to act on compulsory powers, and any advice which could be given on the vexed question to which he had referred would be of the greatest assistance to him in his work.

Mr. H. E. Melville (Member of Council, Institute of Actuaries) (Visitor) remarked that Mr. Collins had drawn attention, particularly in connection with the valuation of a life interest, to the importance of dealing with net income. That was a point which in the old days, with income tax of less than 1*s.* in the £, did not matter very much ; but to-day, with income tax at 5*s.* in the £, it was very important to bear in mind. When a sinking fund was set up on any wasting security—and a life interest was of that nature, the sinking fund being a life policy—it had to be provided out of net income, and not the gross income before deduction of tax.

Mr. A. W. Crampton (Fellow) said the point that he wished to raise might be regarded as outside the scope of the discussion, but he would like to see a great extension of the system of purchase of life annuities for the redemption of the National Debt. That had been advocated before the National Debt Committee (1927) by Mr. J. St. Loe Strachey. The Committee did not see its way to make a recommendation on the lines of Mr. Strachey's proposal, but personally he still thought that something should be done in that direction. As the years went by, nothing whatever was being put into the national sinking fund, and the enormous War Debt was being passed on to posterity. The present generation was not by any means paying its way. The National Debt Committee recommended that at least £50,000,000 a year should be put aside as sinking fund, to be increased as soon as possible to £75,000,000 of £100,000,000. He felt that if something of that sort could not be done, and if the volume of taxation could not be lessened by the redemption of the National Debt, it would be necessary to resort to another expedient which might not be so satisfactory to investors. The burden was so great that it might be necessary to put some term or limit to the number of years for which the nation would be prepared to pay interest on the money.

The PRESIDENT, in putting the vote of thanks, said the Institution was greatly indebted to Mr. Collins for his admirable paper. He understood that there was no text-book on the branch of the subject with which the paper dealt, and therefore he would congratulate the members of the Institution who practised in that branch on having so valuable a paper to which to refer. He would remind Mr. Collins that, although the audience that evening might seem comparatively small, the paper would be read in the *Journal* by the 9,000 members of the Institution.

The vote of thanks was accorded by acclamation.

Mr. F. L. COLLINS, in reply, expressed his thanks for the cordial way in which the paper had been received. Referring to Mr. Lake's remarks, he said that to buy a reversionary life interest without a policy was a sheer gamble ; the only case in which a transaction of that kind ought to be considered was where it was possible to take out a policy on the life of the reversioner for a sum sufficient to cover the life interest when it eventually fell into possession. Then it became a contingent reversion to the sum assured on the death of the life tenant covered by a whole life policy instead of a survivorship policy. Unless there were a great difference in age—*e.g.*, if the reversioner were a grandson of the life tenant—the value was usually extremely small and the policy seemed to be enormous. To enter on such a transaction was like carrying the Old Man of the Sea, because it was necessary to pay the premium on the enormous policy as long as the two lives jointly survived, and by the time the life tenant died more might have been paid in premiums than would actually be received.

Not long ago a man succeeded to a peerage who had sold the best part of his life interest many years ago, before estate duties were anything like as heavy as they were to-day, and the estate duty swallowed up anything there might otherwise have been for him, so that he died almost destitute. It was a very sad case, but there was nothing that the purchasing company could do, as it had bought a fixed annuity forming a first charge. The income tax, too, was taken off at a rate which had not altogether been anticipated. The best advice to give to anyone who wished to sell a reversionary life interest was the advice given by *Punch* to those about to be married.

Mr. Lake also said that the only reliable tables were those in *Whitaker's Almanack*. It was true that *Whitaker's Almanack* was the only book published which contained the 1931 census results and the mortality tables based on them ; but, after all, the volume containing those tables, and also a very admirable

report by Sir Alfred Watson on the subject, could be bought for 3*s*. from the Government publications department. The answer to Colonel Cole, who wanted to know the best table to use, was that at any rate that was one which could be used, and no doubt the next Government annuitants table would be published in due course. The Government were really redeeming debt by their annuities, although Mr. Crampton did not seem to realise it. Each time someone bought an annuity he bought Consols and handed them over to the Commissioners of the National Debt to be cancelled, and so by an imperceptible process part of the debt was being paid off in that way. The Government did not want to pay off too much ; if they found that their terms were becoming much better than the offices were able to offer, they would alter those terms by having another mortality investigation, and the offices would do likewise, because neither side really wanted to have all the business.

He was very glad that Mr. Jenkins had taken part in the discussion. He was afraid that he had criticised Mr. Jenkins' book. The fundamental idea was excellent, and the diagrams were an admirable way of seeing the trend of the number of years' purchase ; but, after all, the diagrams were no better than the data from which they were derived, and it was taking a leap in the dark to look at the diagrams without realising how they were calculated. By so doing it was easy to overlook the fact that for the life interest the number of years' purchase hinged on the net premiums by the English No. 9 Table at 3 per cent., combining the sexes. Only a few offices which did not pay commission quoted nearly such low rates as those for whole life non-profit policies.

It must be remembered that the English Life Tables were based on the census, which was not very reliable. The Registrar-General had to broadcast talks to the nation to tell them how to fill up the forms. Some people did not know how to write, and very few at the advanced ages knew their age exactly. The particulars had to be filled in by the head of the family, who often had to ask his wife how old she was. The table given in the paper of the expectations of life by the English Life Tables at various dates, in spite of the improvement in the last fifty years, showed that there had not been much gain at the advanced ages, and that was the cause of the expectation at sixty-five not increasing more as the expectation of sixty-five depended on the mortality at all the subsequent ages. The Registration Act was passed a hundred years ago, in 1837, but the registration of births was not made compulsory until about 1873. People of one hundred and five, or a like age, could seldom prove their ages ; they could not produce a birth certificate. They might

produce a baptismal certificate, but that was a very weak reed on which to lean, because a hundred years ago very large families were the rule, of, say, thirteen children, of whom six or more would die. They usually had some favourite family name ; the eldest son was called John, perhaps, and the eldest daughter Susan. When John the first died and another boy was born he was given the same name—John. John the second lived to an advanced age, and people searched the baptismal records to see how old he really was, and they found the entry relating to John the first. They did not bother to go on perhaps ten years to see whether another John belonging to the same family was baptized, and thus many people at advanced ages were quite innocently under a delusion as to their true age. The ages in the census, which were not proved in any way, were very unreliable. According to the table to which he had referred, in fifty years the males had improved 0·8 year at age sixty-five, which was 9·6 months, and the females 1·6 year, or 1 year and 7 months.

Mr. Bedells had also discussed the expectation of life, but he felt that the real point was brought out by Mr. Lever, namely, that it was plain from the tables that there was a trend. The mortality was becoming less and the vitality greater all the time, but the figures at present available were not up to date ; they were ten years behind on the annuities and five years (being based on the census of 1931) on the population. If that trend continued it must be remembered, when buying a reversion now, that the life tenant was going to live over the ensuing years, and would experience the mortality of the future, not the mortality of the past. That was why, in dealing with the mortality of life tenants, he considered that it was appropriate to use the most stringent table obtainable. The rate of interest could be reduced a little, but no risks on the ground that the life tenants were just like other people, some of them unhealthy and some of them in lunatic asylums, could safely be taken. If the life tenant were unhealthy the owner did not sell the reversion. It was possible to borrow on it instead, and there was a proverb in reversionary circles that a bad loan was a good purchase. Mr. Jenkins had also suggested that lunatics did not live sheltered lives, but it must be remembered that looking after those lunatics was a living to those concerned. Lunatics might not live, but they existed often to a considerable age.

Whitaker's Almanack also gave a table showing the value of an annuity-certain for a term of years, and illustrated by an example how to arrive at the value of a life annuity approximately by using the expectation according to the method which he had criticised in the paper, which was admittedly wrong. He hoped

that the editor who had so courteously consented to the table being reproduced in the paper might be able to find some way of enlightening the public as to the correct way to value an annuity or pension. If anyone wanted to know the best mortality table to use, however, the right course would be to ring up Mr. Jarvis, the Assistant Secretary at the Institute of Actuaries, on the telephone when he felt sure that the right answer would be forthcoming.

What Mr. Crampton had said about the National Debt was strangely reminiscent of Dr. Price, who constructed the Northampton Table. Dr. Price was mentioned in Green's *Short History of the English People* as being in a terrible state of trepidation lest the National Debt should exceed £100,000,000, holding that if it did the country was doomed. That was a very long time ago. It went over £100,000,000, and nothing very dreadful happened, but Dr. Price invented a wonderful theory for repaying it. He said that if a penny had been invested at the time of the birth of Christ and had rolled up at compound interest, it would amount to many thousands of pounds in 1810, and that all that was necessary to repay the National Debt was to borrow money at simple interest and to let it accumulate at compound interest, but how that was to be done no one ever understood.

Paper No. 577.

THE RENTAL VALUE OF LIGHT.

By G. Leslie Head, M.Inst.R.A.

Paper to be read at the Ordinary General Meeting of the Chartered Surveyors' Institution on Monday, 10th May, 1937.

The subject of this paper, as its title is intended to show, is the value of natural light to buildings and the effect on rental values which may be caused by its curtailment.

Modern development by high buildings in already densely built up areas frequently causes a loss of light to the older buildings around them and consequently these buildings sometimes suffer damage by loss of rent. The valuation of this loss has always been a difficult problem, and it is one which is now arising more often and in more aggravated forms than it did in days gone by.

My object in the following pages is to indicate lines along which such a valuation might be made. I do so with a view to inviting criticism and discussion, for the subject is one upon which there is room for many different opinions. The increasing importance which is placed on light to-day and the greater frequency with which obstructions occur render it desirable that opinions should be expressed from every possible angle.

In the past the assessment of this loss of value was largely a matter of guesswork. With the best will in the world the limits of honest opinion were wide. That they should have been so is not altogether surprising when one comes to consider the lack of data upon which such opinions were formed. A few angles, usually drawn from the cill, were the only means of comparison, and these, as we know to-day, meant very little.

When, in 1928, Mr. Waldram read his paper before the Institution he gave to his profession a means of removing

a part of the problem from the sphere of guesswork to that of precision. He told us of a method of determining with considerable accuracy the amount of light in any room under any given set of circumstances, whether in the present or in the future.

But even with the accurate data provided by this method there still remains the problem of placing a value upon the ascertained quantity of light. It does not appear that it will ever be possible to reduce this valuation to a formula or to make it with anything like the same degree of accuracy with which the amount of light may be measured. A large element of guess must always be present, but it ought to be an educated guess.

There is no royal road to valuation ; instead there is a labyrinth of twisty lanes, and at every turn the valuer must rely upon his own judgment and experience. I will endeavour to indicate the steps in a logical chain of reasoning by means of which a properly considered opinion may be reached. I propose to do this by pointing out certain factors which govern the value of light and by showing how they may be taken into account. It appears to me to be almost axiomatic that the more factors we can identify and examine, the nearer we shall approach to the truth and the closer will the limits of honest opinion converge.

I do not propose to describe the methods adopted by Mr. Waldram for the preparation of daylight plans. That subject has been dealt with by others more qualified than I am. Instead I shall commence at the point where a daylight plan having been made it becomes necessary to examine and value the results which it shows.

First, I will deal with the interpretation of a daylight plan, what it is, and what can be inferred from it. Next, I will lay before you certain suggestions as to the general principles which bear upon the value of light. Then I will explain how these principles may be used in making a valuation, and, finally, I will draw you attention to some items of consequential damage which may not always be assessable in terms of rent.

Daylight Plans.

The most reliable basis upon which to rest a valuation of a loss of light is undoubtedly that provided by what I have referred to as daylight plans. These plans are at present the only method we have of estimating with any degree of accuracy the effect of an obstruction which is not actually in being.

A valuer, like any other craftsman, should understand the tools with which he is expected to work. He need not necessarily be acquainted with the complicated processes involved in the preparation of a daylight plan, but it is of primary importance that he should realise what it means and what the information upon it implies. I will, therefore, deal first with the interpretation of daylight plans.

Let us consider what we mean when we speak of a room as having a good or a bad light. Light is not equally distributed over all parts of a room ; some parts are lighter than others. The light which is usually measured is that which falls upon a horizontal plane at table level which is referred to as " the table plane." This table plane is not equally illuminated all over ; it is brighter near the window. The brightness at any particular point upon the table plane depends upon the amount of sky visible from that point and upon the angle at which that sky can be seen.

The brightness or otherwise of any point is perceived by the occupant of a room owing to the effect which it has upon his eye. It has been found that the human eye adapts itself, within certain limits, so as to be able to work comfortably in varying degrees of illumination. It does not appreciate variations so long as they remain within those limits. It is, therefore, found to be possible to reduce, to a certain extent, the intensity of the light in any brightly lighted part of the room without creating discomfort. There is, however, a degree of intensity below which it is impossible to reduce the light without producing discomfort to those using it. This degree is known as the " grumble " point," and its value, in terms of visible sky, is now generally agreed. It is customary to describe light of greater

intensity than the grumble point as " adequate light " and light of less intensity as " inadequate light." These terms will be used throughout this paper.

It has been found that from those parts of a room where the light is of a " grumble point " intensity, the amount of sky visible is either very small or is visible only at a very flat angle. From this we are able to formulate a general statement:—

> If from any point in a room a small amount of sky can be seen at a reasonably steep angle there is enough light at that point for ordinary use ; but if from any point either no sky is visible, or it is visible at a very flat angle, then the light at that point is not sufficient for ordinary use.

If, therefore, a plan of a room is prepared and a line is drawn upon it dividing that area of the table plane from which sky can be seen from that area from which it cannot, we shall have a first approximation of the true conditions in the room ; that is to say, the area from which sky can be seen will approximately represent the area of workable light and the remainder will be poor light.

A rough idea of the adequately lighted area in a room may be obtained by means of a hand mirror. This mirror should be held at table level and tilted so that the image of the window head is visible. The mirror is then moved about the room, still at table level, until the image of the sky can just be seen. At this point in the room the mirror is on the edge of the adequately lighted area. By tracing out this edge in various parts of the room the whole of the area of adequate light may be mapped out. Needless to say, this method is only of use for judging the conditions actually obtaining at the time of making the survey. It will not be of help in estimating conditions to be set up by an obstruction not yet in being.

In order to convert this approximation into a more exact representation of the facts it will be necessary to calculate the amount of visible sky which is required to produce that degree of illumination which we call the grumble point and

to draw upon the plan a second line from any position on which this amount of sky can be seen. This second line is known variously as the grumble point line, the ·4 per cent. line, or the limit of adequate light. It has the same significance on a daylight plan as a contour line has on a map and it is usually the only line which is shown. It will always be nearer to the window than the first line, but in the case of steep angles it will only be a few inches nearer. On the other hand, in cases of flat angles, that is to say when light can penetrate some distance back into the room, the two lines may be separated by several feet.

A daylight plan, therefore, is a plan which shows by means of a contour line the separation of adequately lighted areas from the inadequately lighted ones. The mere separation of these two areas is not, however, the whole story. A daylight plan is like a map of a country with only one contour line upon it. Such a map, while serving perfectly to indicate such land as lies above or below one certain level, does not show the height of the mountains or the depth of the valleys. It is, of course, quite possible to add further contour lines to the adequately lighted areas showing parts of the room where twice, three times, or, for that matter, twenty times as much sky is visible as can be seen from the grumble point, but such contours are not usually shown, for, except to give a complete picture, they serve no useful purpose.

It is not possible to contour the inadequately lighted areas, for no sky is visible from the greater part of them. Nevertheless it must not be assumed that because there are no geometrical means of contouring these areas they are uniformly if inadequately lighted. It is not so, and I will endeavour to show why.

Let us consider for a moment exactly how the inadequately lighted area is lighted and why it is lighted at all. We have seen that the original source of daylight is the sky and we know by the laws of optics that light travels in straight lines. How, then, can light reach those parts of a room from which no sky is visible, and why are not those

parts pitch dark? The answer is that light reaches them by reflection from those parts of the walls of the room which are lighted directly from the sky and from reflecting surfaces outside the window. The intensity of any of this reflected light is seldom sufficient to be considered as adequate ; so much of it is lost in the process of reflection that what is left is usually well below the value of the grumble point.

Although I have referred to light as being reflected from walls, I do not mean the kind of reflection which is so described in the science of optics. In that type of reflection light, falling upon a smooth reflecting surface from a certain direction, leaves it in a different but nevertheless definite direction. The type of reflection which we get from the comparatively rough walls of a room is more in the nature of dispersion ; that is to say, that although light may fall upon them from one direction it is dispersed in every direction. Light, therefore, reflected from ordinary walls is dispersed, some falling upon the adequately lighted table plane, some on to other parts of the walls and ceiling, and some on to the inadequately lighted table plane. Moreover, light dispersed in this way will, in the remoter parts of the room, tend to obey the inverse square law by which the intensity of the light will vary inversely with the square of the distance from the reflecting surface. Consequently we expect to find, and do in practice find, that the remoter parts of a badly lighted room are darker, and sometimes much darker, than parts just beyond the adequate area.

It would appear, therefore, that as there are graduations of inadequate light there must also be contours. It would doubtless be possible to draw them by means of a delicate photometer, but such an instrument is only of use in observing the conditions in a room at the time of survey ; it cannot forecast the effects of a future obstruction.

And now let us compare two daylight plans of the same room under two different degrees of obstruction:—

Firstly: when there is a low building opposite ; and

Secondly: when there is a high building opposite.

The only difference which will be apparent on the plans will be that the grumble point line will be nearer to the window in the second case than in the first. But had the plans been fully contoured, we should have noticed that in the second case the light contours in the adequate area had moved forward with the grumble point and had become more closely packed. In the same way we should notice, had it been possible to draw them, that the contours in the inadequately lighted area had also moved forward and that new and darker contours had appeared at the back of the room. Not only has the area of workable light become reduced and more concentrated and the area of inferior light become increased, but the inferior light has become worse. The mountains have, as it were, become steeper and the valleys deeper.

In visualising the general effect of a lighted area shown on a daylight plan it is necessary to take into account the shape and size, not only of the adequate area, but also of the inadequate area and whether there are any parts likely to be so dark as to be conspicuous. As far as the adequate area is concerned note should be taken of whether it is in such a position that a proper and reasonable use may be made of it, and whether any reflection of direct light is likely to occur from walls. I have found from experience that the attractiveness of a room is largely dependent upon a reasonable proportion of directly lighted walls. For instance, in a case in which the grumble point line runs fairly straight across the room some of the flank walls are illuminated, and the general effect in the room is considerably better than when that line is a closed curve and does not touch the walls at all, even although the areas of adequate light may be the same in each case.

Before it is possible to place figures of value upon the information gathered from a daylight plan we must find some way of measuring the amount of light in a room. We shall find that the ordinary units of candle-power will be of no use to us for this purpose, for these are measures of intensity, and the intensity varies in different parts of the

room. What we require is some measure of general illumination that we can apply so as to be able to say that such and such a room has only so many units and is therefore not so well lighted as another room which has so many more units. The most usual method of measuring the general illumination of a room is to compare the area of adequate light with the area of the room. For instance, a room with a total area of 200 square feet and which has 100 square feet of adequate light would be described as being 50 per cent. lighted. If, on the other hand, it had only 50 square feet of adequate light, it would be described as being 25 per cent. lighted. This is not an ideal way of comparing the illumination of one room with another, for it takes no account of the added attractiveness given to a room by directly lighted walls. What is required is some method by which we may make a qualitative as well as a quantitative comparison. In other words, we not only require to measure the amount of light in a room but also its general effect. This might be done without unduly complicating our calculations by discounting a part of the adequately lighted area in cases where walls are not illuminated to a normal extent considering the area of adequate light available.

Tentatively I would put forward the suggestion that in all cases where the grumble point line runs across the room in a normal manner the actual area of adequate light should be the basis of the measure of general brightness ; but when the grumble point line does not touch the walls at all, the area of adequate light should be taken as being equal to an area 25 per cent. less than it actually measures. Intermediate degrees of wall lighting could be allowed for by deducting some lesser proportion than 25 per cent. In this way we shall create a basis of comparison more nearly approaching the truth than by directly comparing the actual areas of adequate light no matter what may be their disposition. It must be understood that this correction in no way applies to a case where the strictly utilitarian measurement of useful light on, say, desks or work benches is to be

made ; it is only of use in cases where the utilitarian is tempered with the æsthetic aspect such as might be the case in residential rooms and private offices.

We now have a method of estimating the actual illumination of a room. Next we have to compare that light with normal demands.

Standard Light.

It is generally accepted that there is a degree of lighting beyond which additional light becomes, in ordinary cases, unnecessary to a room. This degree is described in the case of *Colls* v. *The Home and Colonial Stores* as being such an amount of light as is necessary, according to ordinary notions, for the ordinary purposes of inhabitancy or business.

In this paper I propose to call this amount of light "standard light." The judgment in the *Colls* case, however, did not specify the exact amount of light in such terms as we are now able to use, and consequently we must look for such other definition of "standard light" as will, without conflicting with the above judgment, give us a basis of comparison with other degrees of illumination and become linked up with rental value.

The *Colls* judgment, in fixing standard light, assumed that rental damage would follow if the light were reduced below that standard. It did not, however, state that loss of rent would not occur by reason of deprivations which still leave enough light for ordinary users. It is, I think, fair to assume that were such loss to occur, it could only be by reason of the light which is in excess of standard light being required for purposes beyond the ordinary ones of habitancy or business. Such light could only be described as a special light and the rent attributable thereto as a special rent.

This line of argument leads us to the conclusion that if a reduction of light below standard involves a reduction in rent, an increase above standard will not involve a corresponding increase in rent except for special purposes.

Standard light may therefore be defined as that amount of light which is necessary to a room in order that it may command an ordinary rent according to the figure generally ruling in the district, or to borrow a term which has been used in an entirely different connection, "standard rent." We are free to estimate the amount of this light in terms of adequate area for any particular case.

Standard light, being a degree of illumination, can be expressed as a percentage in the same way as any other degree of illumination. We may say, for instance, that we regard the standard light of any given room as 60 per cent., meaning that the area of adequate light should be six-tenths of the area of the room if it is to command its standard rent.

We find by experience that the figure of standard light is not the same for all rooms, but differs with the locality and general user. The amount of light which an individual expects, and will pay for, appears to vary considerably in different cases. Consequently it is necessary in each and every valuation to form an opinion as to the proper figure to represent standard light.

The main factors which appear to govern this figure are competition and user. Competition is the result of the excess of demand over supply. It usually occurs only in certain comparatively small districts where the positional advantages outweigh the amenities. In these districts the efforts of supply to overtake demand result in the land becoming closely built over to the detriment of the natural lighting of the buildings. Up to the present there appears to be very little evidence that this restriction of light in highly competitive districts has had, except in extreme cases, an appreciable effect on rents. That is to say, it has not been possible to obtain a higher rent in a competitive area for a room with more than the usual amount of light for the locality except for a special purpose. Tenants appear to be content with a comparatively low standard of light and to be unwilling to add to their already heavy rent by paying extra for rooms having more than this low

standard of lighting. Position is of paramount importance ; light is a secondary consideration.

If, on the other hand, the selection of a room or office is not limited to special areas, the element of competition is absent. Demand is not ahead of supply. The land is not so closely built over, and consequently the general standard of lighting is higher. There is a permanent floating surplus of accommodation, a great deal of which has comparatively good lighting. A tenant has a wider choice of well-lighted rooms, and it is only to be expected that he should exercise his preference for a reasonably good light. As a result, by a process of natural selection, the better lighted rooms become let first, and the badly lighted ones can only be disposed of at reduced rents.

In the less competitive districts, therefore, not only is the land less closely built over and consequently the general standard of light higher, but we find that a greater importance is attached to light generally.

It is a common experience with all of us who have been concerned with properties in the City of London to have found tenants paying a full rent for, and quite happily occupying, accommodation so dark that had it been in, say, Bloomsbury it would have been let at only a rent well below the ruling figure for that locality. The only explanation which appears at all probable is that the effect of competition is such that a degree of illumination which might be enough for ordinary purposes in a highly competitive district is regarded as falling so far short of that standard in a non-competitive district that the rooms will not let except at a reduced rental. By its definition, standard light cannot be the same figure in each of these two cases, and it is obvious that a different figure must be taken for every case according to circumstances.

The factor of user also operates to cause variations of standard light in different circumstances. Residential rooms when used as such in the day time are usually found to require more light than offices. Bedrooms in bed and breakfast hotels, on the other hand, are seldom seen by

their occupants in anything but artificial light and should not require anything but a low standard, while bathrooms in modern residences are very frequently not naturally lighted at all without apparently affecting the rent to any appreciable extent.

The factor of competition governs the standard light of all buildings according to their address, while the factor of user modifies the standard light of buildings in a given locality in accordance with the class of building and the use to which it may be put.

It is clear, then, that standard light cannot be taken at a constant figure for all parts of the town or country and for any user. Any attempt to do so will result in the breakdown of our definition of standard light.

The opinion is often put forward that the figure of standard light should be greater in the case of rooms on upper floors than in the case of rooms on lower floors. The argument is that these upper rooms may reasonably expect to have more light than the lower ones.

Let us assume a number of rooms of equal size, accessibility, convenience and with equal services ; the only difference between them being that they are on different floors. Let us further imagine the rooms to be arranged in a stack, one immediately over the other, and that their windows face on to a street on the other side of which there is a building of similar height.

It is obvious the rooms will be unequally illuminated, the lower ones will have much less light than the upper ones, and we should expect a corresponding difference in rentals. If, however, each room commands the same rent, as we sometimes find they do, it is clear that there may be two explanations—(*a*) that the light of the lowest room is all that is required in any room for ordinary purposes and may be taken as standard light for all; for it would appear that an increase of light such as exists on the upper floors has not resulted in an increase of rent, or (*b*) that each room requires a different figure for standard light according to its floor level in order to maintain an equal rent with the others.

So long, therefore, as the rents on each floor are equal, there does not appear to be any indication as to which of these two explanations is the correct one. Suppose, on the other hand, we find that rents for the upper floors are higher owing to the better conditions of light which obtain there. In this case there is only one explanation of this variation of rent, and that is that the lower rooms cannot be receiving standard light, but something less, and that if this light is increased, as it is in the case of the upper ones, a higher rent is obtained. From this we may argue that, as standard light is the least amount of light that will command standard rent, the room which is the lowest in level of those which command the highest rent is the one the light of which most nearly approaches standard light.

So long, therefore, as rents are the same on each floor, there are two possible alternatives for the figure of standard light—(*a*) the light of the lowest room or (*b*) a variable figure based on the light to be expected on each floor. The moment that we can detect an increase of rent on the upper floors which can be traced to the possession of a better light, we are in a position to fix the figure of standard light at one figure throughout. Is it not reasonable, therefore, to suppose that alternative (*a*) is the true explanation in all cases?

It is to be noted that there is a marked tendency to-day for the upper and consequently better lighted floors of new high buildings to let more readily than the lower ones. It will probably not be long before this tendency becomes generally recognised and followed by a proportionate adjustment of rent. When this has occurred in a sufficient number of cases to furnish reliable data, we shall have a most useful indication of the value which the public places upon light and the standard of lighting which they expect and require. Till that time the valuer must rely on his own judgment.

It is impossible to give set figures for standard light for any user and for any locality, for so much depends upon the circumstances of the case. Moreover, what may be

true to-day may not be so in a few years' time, when the standards of human comfort may have risen and competition may have lessened in one area and increased in another. Nevertheless I venture to put forward for discussion a schedule of suggested figures for standard light in various circumstances.

SUGGESTED FIGURES FOR STANDARD LIGHT.

Locality.	Measure of Standard Light
Dwellings.	per cent.
Highly competitive and fashionable districts ...	40
Fashionable town districts	50
Unfashionable town districts	60
Suburban districts	70
Country districts...	80
Offices.	
Highly competitive districts	33
Competitive districts	40
Non-competitive districts	50
Suburban districts	60

In the case of factories adequate light may be required over all parts where it is required to place work-benches. Standard light in the case of a factory may therefore be expected to figure fairly high, perhaps 70 per cent. to 80 per cent.

Having formed his own opinion of a fair figure for standard light, the valuer must pass on to the valuation of that light or that part of it which is enjoyed by the tenant.

STANDARD RENT.

I must here tender my apologies for adopting a term used in quite a different sense in the Rent Restriction Acts. My only excuse is that, search as I will, I cannot find another term which will fit the case. Many of us hope that the demise of those Acts will occur in the not too distant future, and then perhaps the term which I have selected will no longer have a double meaning.

We need for the purposes of a valuation of light to connect standard light with a rent which it, and it alone, will produce in conjunction with the available floor space. To do this it will be necessary to eliminate all other rent-producing elements before we can arrive at the value of the part played by light in the production of rent.

Rent is a combination of a number of elements each of which contributes to the value of a property. In the case of individual rooms it is hardly ever a sum paid solely for the use of a room ; there are nearly always services or amenities of some sort which are included in the rent and which would make a difference were they excluded.

When a tenant rents a room, whether at an inclusive rent or not, he pays, in meal or in malt, for the following:—

(1) Physical space ;

(2) Light ;

(3) Special outlook and aspect (if present) ;

(4) A percentage on the above three items in the form of rates ;

(5) Repairs and insurance ;

(6) Services, heating, cleaning, lifts, &c.

For the purposes of this paper we need to resolve rent into its component parts and to isolate item (2). The elimination of items (5) and (6) is comparatively simple ; we have only to deduct from an inclusive rent the value of the services, repairs and insurances. Item (3) will seldom present much difficulty, for it is only likely to arise in cases where the room has an exceptional outlook—over a park or a river, for instance. Item (4) is usually only a matter of arithmetic, and in any case the exact amount of the rates is either directly available or can be calculated by apportionment of the rateable value. We have now eliminated everything except items (1) and (2), and therefore arrive at a rent which does not contain allowances for special amenities such as outlook, services, and the like. This

rent, being composed only of space-rent and light-rent, we may describe as " basic rent." The maximum value for basic rent occurs when it arises out of the possession by a room of standard light. It is to this maximum rent that I propose to apply the term " standard rent."

To make my meaning clearer I have set out hereunder in tabular form the various components of rent and the names which I have applied to the various groups of components.

TABLE OF COMPONENTS OF RENT.

Space-rent				
Light-rent				
———	Basic rent			
	Outlook rent			
	———	Nett rent		
		Rates		
		Repairs		
		Insurance		
		———	Gross rent	
			Services	
			———	Inclusive rent

When basic rent arises out of the possession by a room of standard light it may be described as " standard rent."

STANDARD LIGHT-RENT.

Having formed an opinion as to how much light is required in a room for it to be able to command its standard rent, the next step will be to estimate the cash value of that light—*i.e.*, to determine how much of the standard rent of a room is attributable to the possession by that room of standard light.

It is difficult to imagine a case where a room, having lost all its adequate light, is not worth something, however small. There is usually some purpose to which it can be put and for which it will command a rent. This rent I will call, for want of a better term, " space-rent."

The difference between the space-rent and the basic rent must represent the amenity value of such light as the room possesses: to this amenity value I will apply the term " light-rent." Light-rent will be at its highest value in the

case of a room which commands standard rent, and I will call this maximum light-rent " standard light-rent."

It would appear that the obvious way of arriving at standard light-rent is to consider the rent of the same room under two different conditions of lighting. Firstly, when in possession of standard light, *i.e.*, the standard rent, and, secondly, when the room has no adequate light at all, *i.e.*, when the grumble point is right up against the window. This latter condition is not that which would obtain if there were no window at all, for then the room would be pitch dark. It is such a condition that the room appears to be in a state of perpetual twilight, with enough light to see to walk about and to distinguish objects, but insufficient to read for long periods comfortably, even near the window, and probably impossible even to read at all in the more remote parts of the room. In fact, the condition of the room would be almost exactly similar to that which would obtain at dusk at the moment when a person working at the window would consider it necessary to switch on the artificial lighting.

If the valuer is able to form an estimate of these two rentals based on these two separate conditions, he will be able, by deducting one from the other, to arrive at the value of standard light-rent, which for convenience is best expressed as a percentage of the standard rent. If, for instance, a room with a standard rent of £100 a year will fetch only £40 a year if it has no adequate light, then the standard light-rent would be described as being 60 per cent. of the standard rent.

In making his estimate of the value of standard light-rent the valuer must be guided by his judgment and experience, and should take into account the effects of competition and user. I have mentioned these factors before under the heading of " Standard Light," and I will not repeat them here. They will influence standard light-rent in exactly the same way that they influence standard light, and consequently we should expect to find a relationship between the two sets of percentages. It does not appear that this

relationship is capable of any mathematical proof, but it would appear reasonable to assume that the more light that is needed in a room the greater the loss when it is taken away.

Again I will put forward a few suggestions for appropriate values for standard light-rents in different circumstances. It must be realised, however, that they are only suggestions and that the individual circumstances of each case must be taken into account.

ALLOCATION OF STANDARD RENT BETWEEN LIGHT AND SPACE.
STANDARD LIGHT-RENTS.

Locality.	Light.	Space.
Dwellings.	Per cent.	Per cent.
Highly competitive and fashionable districts	50	50
Fashionable town districts	60	40
Unfashionable town districts	70	30
Suburban districts	75	25
Country districts	80	20
Offices.		
Highly competitive districts	25	75
Competitive districts	33	66
Non-competitive district	40	60
Suburban districts	50	50

DEPRECIATION OF LIGHT-RENTS.

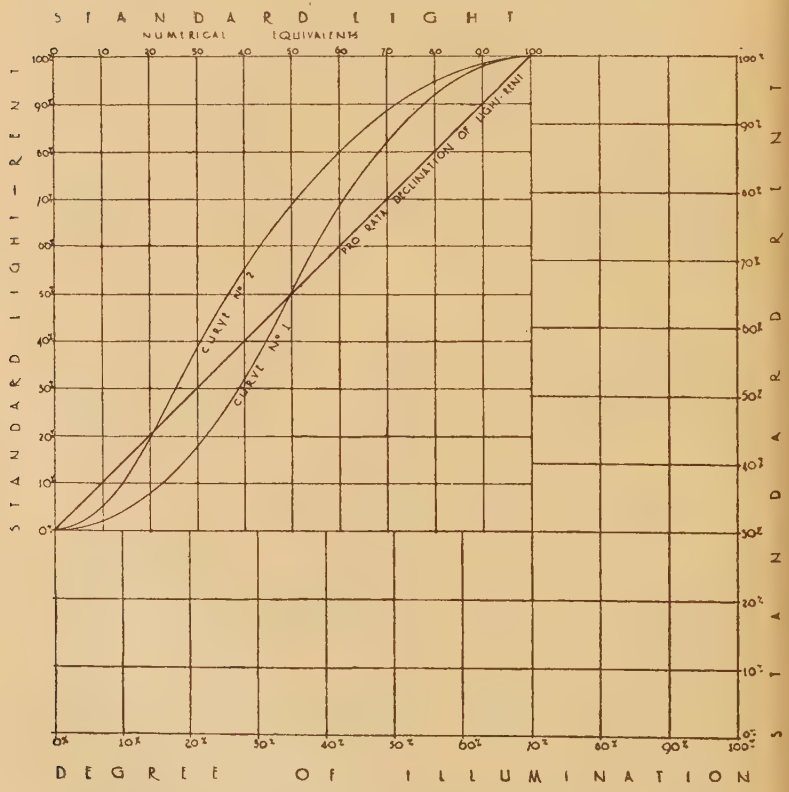
The figures for standard light and standard light-rent having been determined, we now have to find the light-rent of a room illuminated with something less than standard light.

We have already seen that it is possible to express a degree of illumination in terms of the area of a room, but if we only wish to consider that degree in terms of standard light we shall require some more convenient method of expression. Let us therefore consider standard light, no matter what it may be, to be divided into 100 equal parts, each part being represented by an equal number of square

feet of adequate light. Any degree of lighting can then be expressed as being equal to so many of these parts.

I propose to call the number of these parts the "numerical equivalent" of the light. For instance, suppose the standard light of a room is equal to 150 square feet of adequate light and the actual light is equal to 90 square feet. By a simple rule-of-three sum we shall find that when 150 is reduced to 100, 90 becomes 60. The numerical equivalent of the actual light is therefore 60.

I would refer you to the graph hereunder:—



In the above graph the whole square represents, on the vertical dimension, standard rent and, on the horizontal

one, the total area of a room. The smaller square in the top left-hand corner of the larger one represents standard light-rent by its vertical dimension and standard light by its horizontal one. Both dimensions of each square are divided, the larger to show percentages of standard rent and of area, the smaller to show, vertically, equal fractions of standard light-rent, and, horizontally, the numerical equivalents of light. It will be seen, therefore, that the graph has been drawn to illustrate the case of a room in which standard light is 70 per cent. of the area of the room and standard light-rent is 70 per cent. of the total rent. There is no significance in the selection of these two figures ; they have been chosen for convenience in drawing the graph. As we are now dealing only with the depreciation of standard light-rent caused by the possession of only a fraction of standard light, we need only consider the smaller of the two squares.

If the light-rent were to diminish in direct proportion to the numerical equivalent of the light, its rate of decrease would be steady, and would be represented by the straight diagonal line on the graph. It is probable that in rooms of a purely utilitarian character, such as workrooms or factories, we should find that something of this sort actually takes place. It is quite conceivable that where the sole consideration is the ability to light as many work-benches as possible, the damage to a room will be proportional to the number of benches where artificial light has to be used regularly and consequently inversely proportional to the area of adequate light in the room.

In rooms, however, where stark utility is not the sole consideration, such as in residential rooms or private offices, experience tends to show that a given reduction of light has a much greater effect in the case of a room originally poorly lighted than upon one which had standard light. In these cases the rooms are not regularly used to capacity, and, so far as utility is concerned, only a small part of the room really requires a good working light. Nevertheless, because of the fact that they are not completely utilitarian,

æsthetic considerations demand that, to command a full rent, the rooms must be reasonably well lighted. Æsthetic requirements do not appear to be as sensitive to small deficiencies of light as do utilitarian ones. On the other hand, they appear to be more sensitive to large deficiencies. For this reason the rate at which the light-rent may be expected to fall will not be steady, but will increase as the deficiency grows larger. Instead of being able to represent the rate of decrease of rent by a straight line, it will have to be represented by a curve. This curve must commence nearly horizontally and become steeper and steeper as each successive quantum of light is removed until a point is reached where the light is so reduced that the room begins to lose its market and to be only required by tenants to whom light is not of major consequence. From this point the curve will commence to flatten out and become less and less steep, as light loses its importance, until finally the room becomes so dark that it can only satisfy tenants who have practically no use for light. Our curve, then, will have the appearance of a flattened letter " S."

Once we have satisfied ourselves as to the general shape of the curve, it becomes a question of choosing the right one. Concrete examples, however, of rents paid under different conditions of lighting are usually so overlaid with other factors, such as position, access, service and the like, as to be almost useless ; consequently we are forced to select a curve which appears to be a reasonable one.

The use of a curve to determine the decrease in rent has this advantage over any other method: it is impossible to make the sum of the damages caused by successive deprivations exceed that caused by total deprivation. If the decrease of rent on one sector of the curve is large, it must be correspondingly small on another. For this reason the curve must be selected with care, so that the loss of value is a fair one for all sectors of the curve.

The valuation of light is no exception to the rule that a valuation must be an attempt to forecast the opinion of the public as to the value of a commodity, whether it be

property, amenities, jewels or anything else. To do this the valuer must place himself, as far as possible, in the position of a reasonable member of the public and endeavour to see things from that point of view.

Let us therefore try to see this problem of light value through the eyes of such a person.

Firstly, he will know nothing about daylight plans, percentages of light, curves of diminishing value, or any other of the tools with which the valuer must work. Secondly, he will have a good idea of what rent he would pay for the room if it were normally lighted, and, if he had a use for it. what he would pay if it were a " twilight " room. Thirdly, he would most probably place the room in one of four categories—(*a*) normal, (*b*) darkish, (*c*) dark, and (*d*) very dark. He would, perhaps quite unconsciously, take into consideration the purpose for which he required the room and whether he would have difficulty in getting another and better lighted room. It is to be expected that what he would call dark for a living room he might only call darkish in the case of an office. He would probably be quite unable to distinguish any intermediate stages between the categories, and his ideas of rental value would not decline along a curve but would suffer sudden drops as the room passed from one category to another. His curve becomes a series of steps.

If only it were possible for all men to think alike we might, by experiment, discover just where these steps occur. Unfortunately for the simplicity of our calculations, even reasonable men will be found to differ in their opinions on this point. All that the valuer can do under these circumstances is to try and average the various opinions in one steady curve. It is unlikely that the same curve will apply to all rooms no matter what their use. It is probable that in the case of offices the point where the loss of market occurs will be lower down the curve than in the case of residential rooms, for there is a greater element of utility about an office than about a sitting-room. By this I mean that an office is used primarily for work, and

the enjoyment of its æsthetic amenities is of secondary importance. A sitting-room, on the other hand, is enjoyed rather than used, and æsthetic amenities become of primary importance. Between the chiefly utilitarian work-a-day office and the purely æsthetic boudoir there lies a great number of rooms where the elements of utility and beauty exist together but in varying proportions.

It is, of course, open to the valuer to select his own curve in accordance with his own opinion and experience, but for the purposes of this paper I venture to suggest the two curves which I have shown on the graph. The first of these curves (No. 1) shows the turning-point somewhere about half-way along its length, which would indicate that a loss of market would begin to be felt when the room had only half its proper quantity of light. It is unlikely that any but a purely residential room would begin to suffer such a loss so early. I put forward curve No. 1 as indicating the probable rate of decrease of light-rent in the case of such rooms. The second curve (No. 2) shows the turning-point about four-fifths along its length, indicating that loss of market will be felt when the light is only one-fifth of standard. As this degree of illumination in an average room is about sufficient to accommodate one working desk, it would appear that this curve would reasonably represent the rate of decrease of rent in private offices.

Other curves lying between these two will doubtless suggest themselves as being applicable to residential rooms which contain an element of utility, such as bedrooms and dining-rooms, or to offices which may possess an element of the æsthetic, such as principals' offices, studies and the like.

The selection of the appropriate curve, therefore, is the third decision for which the valuer must rely upon his judgment and experience. There are many possible curves, and I do not put forward the ones shown on the graph as anything more than suggestions.

Having selected a curve, we may now go on to the practical application of it. If we measure off from the curves

the value of the light-rent for every one of the hundred numerical equivalents of light, we can construct tables of factors by which we must multiply the standard light-rent in order to obtain the actual light-rent for any given numerical equivalent of light. Two such tables are given below, one for each of the two curves. The method of using them is as follows: Let us suppose that the actual light in a room has the numerical equivalent of 65 and the

TABLE OF REDUCTION FACTORS.

Curve No. 1.

Light	Factor	Light.	Factor.	Light.	Factor
1 ...	0·0002	35 ...	0·2450	69 ...	0·8078
2 ...	0·0008	36 ...	0·2592	70 ...	0·8200
3 ...	0·0018	37 ...	0·2638	71 ...	0·8318
4 ...	0·0032	38 ...	0·2888	72 ...	0·8432
5 ...	0·0050	39 ...	0·3042	73 ...	0·8542
6 ...	0·0072	40 ...	0·3200	74 ...	0·8648
7 ...	0·0098	41 ...	0·3362	75 ...	0·8760
8 ...	0·0128	42 ...	0·3528	76 ...	0·8848
9 ...	0·0162	43 ...	0·3698	77 ...	0·8942
10 ...	0·0200	44 ...	0·3872	78 ...	0·9032
11 ...	0·0242	45 ...	0·4050	79 ...	0·9118
12 ...	0·0288	46 ...	0·4232	80 ...	0·9200
13 ...	0·0338	47 ...	0·4418	81 ...	0·9278
14 ...	0·0392	48 ...	0·4608	82 ...	0·9352
15 ...	0·0450	49 ...	0·4802	83 ...	0·9422
16 ...	0·0512	50 ...	0·5000	84 ...	0·9488
17 ...	0·0578	51 ...	0·5198	85 ...	0·9550
18 ...	0·0648	52 ...	0·5392	86 ...	0·9608
19 ...	0·0722	53 ...	0·5582	87 ...	0·9662
20 ...	0·0800	54 ...	0·5768	88 ...	0·9712
21 ...	0·0882	55 ...	0·5950	89 ...	0·9758
22 ...	0·0968	56 ...	0·6128	90 ...	0·9800
23 ...	0·1058	57 ...	0·6302	91 ...	0·9838
24 ...	0·1152	58 ...	0·6472	92 ...	0·9872
25 ...	0·1250	59 ...	0·6638	93 ...	0·9902
26 ...	0·1352	60 ...	0·6811	94 ...	0·9928
27 ...	0·1458	61 ...	0·6958	95 ...	0·9950
28 ...	0·1568	62 ...	0·7112	96 ...	0·9968
29 ...	0·1682	63 ...	0·7362	97 ...	0·9982
30 ...	0·1800	64 ...	0·7408	98 ...	0·9992
31 ...	0·1922	65 ...	0·7550	99 ...	0·9998
32 ...	0·2048	66 ...	0·7688	100 ...	1·0000
33 ...	0·2178	67 ...	0·7822		
34 ...	0·2312	68 ...	0·7952		

TABLE OF REDUCTION FACTORS.

Curve No. 2.

Light.	Factor.	Light.	Factor.	Light.	Factor.
1	0·0005	35	0·4719	69	0·8798
2	0·0020	36	0·4880	70	0·8875
3	0·0045	37	0·5039	71	0·8949
4	0·0080	38	0·5196	72	0·9020
5	0·0125	39	0·5347	73	0·9089
6	0·0180	40	0·5500	74	0·9155
7	0·0245	41	0·5649	75	0·9219
8	0·0320	42	0·5796	76	0·9280
9	0·0405	43	0·5938	77	0·9338
10	0·0500	44	0·6080	78	0·9395
11	0·0605	45	0·6218	79	0·9447
12	0·0720	46	0·6355	80	0·9500
13	0·0845	47	0·6487	81	0·9549
14	0·0980	48	0·6620	82	0·9595
15	0·1125	49	0·6749	83	0·9638
16	0·1280	50	0·6875	84	0·9680
17	0·1445	51	0·6998	85	0·9719
18	0·1620	52	0·7120	86	0·9755
19	0·1805	53	0·7238	87	0·9785
20	0·2000	54	0·7355	88	0·9820
21	0·2199	55	0·7469	89	0·9848
22	0·2396	56	0·7580	90	0·9874
23	0·2589	57	0·7689	91	0·9899
24	0·2780	58	0·7795	92	0·9919
25	0·2969	59	0·7898	93	0·9938
26	0·3155	60	0·8000	94	0·9955
27	0·3338	61	0·8098	95	0·9968
28	0·3520	62	0·8195	96	0·9979
29	0·3699	63	0·8289	97	0·9987
30	0·3868	64	0·8380	98	0·9995
31	0·4049	65	0·8469	99	0·9999
32	0·4220	66	0·8555	100	1·0000
33	0·4389	67	0·8638		
34	0·4556	68	0·8720		

standard light-rent has been taken at, say, £50. In the case of an office curve No. 2 may be used. On looking down the table for that curve we find that the figure 65 in the light column is against the factor 0·8469. If the figure of the standard light-rent, namely £50, is multiplied by the factor 0·8469, the product will be the value of the actual light-rent. Thus:—£50 × 0·8469 = £42 7*s*.

Valuation.

Having considered the general principles by which light may influence the rental value of a room, it is now possible to make a valuation of the rental damage due to a loss of light. This may be done in the following manner:—

First: Determine figures for—

(*a*) Standard light, in square feet of adequate light ;

(*b*) Original light, in square feet of adequate light ;

(*c*) Ultimate light, in square feet of adequate light ;

(*d*) Standard rent ;

(*e*) Space-rent.

Second: Compare the original light with the standard light ; if the original light is the greater, ignore the excess and treat the original light as being equal to standard light.

Third: Calculate the proportions which the original light and the ultimate light bear to the standard light, and from these proportions calculate their numerical equivalents on the basis of standard light being equal to 100.

Fourth: From the appropriate table find the reduction factors which correspond to the numerical equivalents of the two degrees of lighting.

Fifth: Determine the standard light-rent by subtracting the space-rent from the standard rent, and multiply it by each of the two factors in turn in order to find the original light-rent and the ultimate light-rent.

The difference between these two light-rents will be the rental damage.

Let us take two examples: the first of a room which

originally had more than standard light and the second of a room which originally had less than standard light. In each case we will assume that the standard rent is £100, for then the results of our calculations will be expressed as percentages of the standard rent.

Example I.

Suppose that an office of 220 square feet, originally lighted adequately over an area of 150 square feet, has its adequately lighted area reduced to 77 square feet. Inspection of the premises leads us to believe that standard light would be 50 per cent. of the area of the room, and that the space-rent would be 40 per cent. of the standard rent.

DATA :

Standard light, 110 sq. ft. (being 50 per cent. of the room area).
Original light, 150 sq. ft. (over standard).
Ultimate light, 77 sq. ft. (numerical equivalent 70).
Reduction factor, 0·8875 (from Tables ; Curve No. 2).

CALCULATION :	£	*s.*	*d.*
Standard rent	100	0	0
Deduct space-rent	40	0	0
Remainder being standard light-rent	60	0	0
Deduct ultimate light-rent (0·8875 × £60) ...	53	5	0
Difference being loss of rental value	£6	15	0

£6 15*s.* is 6¾ per cent. of standard rent.

Example II.

In this case let us take the same room, but let us suppose that the originally adequately lighted area was 77 square feet and that this is now about to be reduced to 33 square feet.

In this example the room was not originally lighted up to standard, and accordingly did not command a standard

light-rent. We must therefore first find the original light-rent and then deduct from it the ultimate light-rent.

DATA :

Standard light, 110 sq. ft. (being 50 per cent. of the room area).
Original light, 77 sq. ft. (numerical equivalent 70).
Ultimate light, 33 sq. ft. (numerical equivalent 30).
Reduction factors from Tables (Curve No. 2).
From original light 0·8875.
For ultimate light 0·3868.

CALCULATION :	£	*s.*	*d.*
Standard rent	100	0	0
Deduct: Space-rent	40	0	0
Remainder being standard light-rent	£60	0	0
Original light-rent (0·8875 × £60)	53	5	0
Ultimate light-rent (0·3868 × £60)	23	4	0
Difference being loss of rental value	£30	1	0

£30 1*s.* is 30 per cent. of the standard rent.

Example III.

For a final example let us take a room with the following data:—

User: Bed-sitting room.
Services: Heating, lifts and constant hot water.
Outlook: Very good; over park, two blocks away.
Room area: 200 sq. ft. Inclusive rent £130.

It is further noted that after deprivation one of the flank walls of the room no longer receives direct light.

		sq. ft.
Standard light at (say) 60 per cent. ...		120
Original light		170 (over standard)
Ultimate light	50 sq. ft.	
Less: 12½% for unlighted wall	6 „	
Adjusted ultimate light...	44 sq. ft.	(num. equiv. 37)

Reduction factor from Tables (Curve No. 1) 0·2638.

Calculation:			£	s.	d.
Inclusive rent			130	0	0
Less: Services ... ... (say)	£10				
Rates, &c.	£35				
Outlook value ... ... (say)	£20				
			65	0	0
Remainder being standard rent			65	0	0
Deduct: Space-rent			26	0	0
Remainder being standard light-rent			39	0	0
Deduct: ult. light-rent (0·2638 × £39) ...			10	6	0
Difference, *i.e.*, loss of rent			£28	14	0

Capitalisation.

There is no need to dwell at length upon the capitalisation of rental damage. The subject is far too well known to require treatment in this paper. As a rule the property rate may be used for this purpose ; that is to say, the capital damage being the difference between the capital values of the two incomes, the one before and the other after deprivation, may be arrived at by multiplying the rental damage by the same number of years' purchase as would be used in capitalising the rent of the premises.

There is, however, an aspect of this method of capitalisation to which attention should be drawn. The capitalisation of a loss of income by the use of a single multiplier is a short cut which is frequently used when dealing with two incomes both of which are in the same class of hazard. But when they are in different classes each income must be capitalised separately, and then the one subtracted from the other.

In cases of severe rental damage it is possible that the income which remains after the deprivation will not be in the same class of hazard as the original income. Not only will it be smaller, but it will be more risky. In cases such as this both the original incomes should be capitalised at the rate per cent. applicable to the hazard of each ; the difference between the two figures thus obtained being the capital loss.

Consequential Damage.

Up to the moment we have been considering damage to rooms upon the assumption that they were rent-producing units. In many cases, however, a single room is only a part of a rent-producing unit. A group of rooms, such as a suite, a flat, or a house, will produce a rent as a united whole, which may be different from the rent which the parts would command if let separately. For instance, the severance of the principal's office from a suite might make a greater difference to the rent than the removal of an equal number of square feet from the general office. Again, the cutting off of the sitting-room from a flat or a house might result in a greater loss of rent than is to be expected from a *pro rata* valuation of the space lost.

A group of rooms all of which are well lighted may lose more rent by reason of the darkening of one of them than can be accounted for by the loss of comfort in that one particular room. How are we to estimate this consequential damage?

There are three lines of approach to this problem. The first is to make a valuation of the damage to the darkened room based upon the rent apportioned from the total rent, foot for foot, and to add something to this for the injurious affection of the remainder.

The second is to so apportion the rent so as to place a greater rent per foot upon the more important rooms than upon the less important.

The third is to increase the standard light-rent of the more important rooms at the expense of the others.

All three of these methods will show an increased damage, when the darkened room is an important one in a suite, over that obtained when the rooms are treated as separate units.

Let us examine each of these methods in turn. The first contains the greatest element of guess, for there is no logical method apparent by which to judge the addition to be made for injurious affection. It is, however, unlikely that the injurious affection of each of the unaffected rooms could be

more than a small percentage of the damage to the affected one.

The second method, by apportioning the rent, has the advantage of keeping the element of guess within limits which are well known to the practical valuer. The total value of the group being known, it should be a relatively simple matter to divide it amongst the rooms in proportion to their importance. The effect of this method is to increase the damage done to the more important rooms proportionately to their importance, and so to provide something for the injurious affection of the remainder. This additional something will, by this form of calculation, vary with the importance of the room and the extent of the damage done to it.

The third method is really a variant of the second one. It is capable, however, of a greater flexibility in that it deals with the two extremes of light and darkness from the point of view of the group of rooms.

Let us suppose that a group of, say, three rooms of equal importance is threatened by the darkening of one of them. Normally, if the rooms were let as separate units, the standard light-rents of each of them might be perhaps 50 per cent. of their standard rents. Considered as a group, however, we have the opportunity of determining the standard light-rent of the group. We can compare the rent of the group when fully lighted with that when one of the rooms is a "twilight" room. This will give us the standard light-rent of one room in relation to the group. Or we can make the same comparison when two of the rooms are "twilight" rooms. This will give us the standard light-rent of two rooms in relation to the group. Considered individually, the standard light-rents of each room would be 16·6 per cent. of the collective standard rents, but it is possible that the standard light-rent of the first room to be darkened might be 25 per cent. of the collective rent, the second 15 per cent., and the third 10 per cent. Here, as before, the adjustment must lie with the valuer and be the subject of his considered opinion.

There are forms of consequential damage which are not expressible in terms of rent, and which will frequently arise, *i.e.*, inconvenience and damage to trade. It does not seem possible to lay down any set lines upon which this form of damage may be assessed. Trade damage will so obviously depend upon the requirements of the particular trade and upon the possibility of rearrangement of plant or fittings. Inconvenience will depend upon the class of tenant and of the use to which he may be expected to put the premises. The assessment of damage under these heads can be made only after a careful consideration of the merits of each case, and there is no apparent reason to suppose that such damage will be in any way related to that determined from a rental basis.

There is, however, one aspect of this form of consequential damage to which I would direct attention. It would seem impossible that one owner could suffer rental damage and damage to trade simultaneously from one deprivation. If he is to suffer the rental damage he must vacate the premises and relet them, while if he is to suffer a trade damage he must remain upon the premises. As he cannot be in two places at once he cannot lose rent and trade at the same time. If, however, he has to move he should have a claim for dislocation of trade and cost of removal.

Conclusion.

In conclusion I would point out that the foregoing paper is an attempt to give a few sailing directions through the fog of uncertainty which surrounds the assessment of compensation for loss of light. I regret that the directions are not more explicit, but individual cases will be found to vary so much in their particular circumstances that it is not practicable to give more than an outline of the general principles of the subject. These principles, as we have seen, may be condensed into a small compass as follows:—

(1) Rooms used for ordinary purposes do not need all the light which can possibly be crammed into

them. There is a point beyond which extra light ceases to be rent producing. It is possible to cut off this extra light without inflicting any monetary damage.

(2) The total removal of adequate light from a room would still leave it worth something, however small. The rental damage by total deprivation cannot, therefore, exceed the capitalised value of the rent.

(3) Partial deprivation must result in a less damage than a total one. Moreover, any partial deprivation can only cause its fair share of the damage caused by a total one, and the sum of the damages caused by successive partial deprivations cannot exceed that caused by a total one.

(4) Loss of rent, except in certain cases, is not directly proportional to the extent of the deprivation of light, and a given quantum of light is usually worth less when the room is fully lighted than when it is poorly lighted.

(5) Damage calculated upon a rental basis must stand by itself, and cannot occur simultaneously with trade damage or damage by inconvenience.

If these general principles are borne in mind by the valuer, there should be less chance of the enormous divergence of opinions which is so frequently met with to-day in light and air cases.